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Determining Molarity Lab

Introduction: Sure, it's easy to *calculate* the concentration of a solution. But can you actually *make* a solution with a given molarity? Is there anything unexpected that can happen when one compound is dissolved in another? The answer to these and other questions can be found in this lab.

Purpose: To calculate and then experimentally determine the molarity of a solution. To understand the effect of dissolving a solute upon the volume of a solution.

Materials: rubber stopper (00)
50 ml graduated cylinder
Droppers
$NaCl_{(s)}$

Procedures:

1.

a) Calculate the molarity of the solution that results when 3.0 g of $NaCl_{(s)}$ is dissolved in 30.0 ml of water. (Show your work, use the correct, etc.)

Answer _____

Have another lab group check your work and sign off
Peer initials _____

b) Measure **exactly** 30.0 ml of distilled water using the 50 ml graduated cylinder. Mass **exactly** 3.00 g of $NaCl_{(s)}$. Carefully add the NaCl to the water in the cylinder - make sure none of the NaCl sticks to the sides - and stir until all is dissolved. Try not to lose any solution when you remove the stirring rod.

2. What is the final volume of your solution? _____

3. What is the molarity of your solution? _____
(Redo the calculation using your final volume from procedure 2)

4. Why does your experimental result differ from your original calculated value?

Peer initials _____

5. Write a hypothesis to explain why the dissolving of salt in water changes the volume of the solution.

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6. Now, knowing the density of NaCl is 2.165 g/cm^3, how would you make the same solution you calculated in 1a CORRECTLY – no change in volume? Write out the steps and show **ALL** calculations. (find the volume of water needed to make the total solution 30ml)

Have another lab group check your work and sign off

Peer initials _____

7. Now make it!

8. **Write** a procedure for making 1.50 Liters of 1.62 M $NaCl_{(aq)}$ solution (mass of NaCl needed and vol. water needed).

Molarity Calculation Practice

Calculate the molarities of the following solutions:

1) 2.3 moles of sodium chloride in 0.45 liters of solution

2) 0.09 moles of sodium sulfate in 12mL of solution.

3) 120 grams of calcium nitrite in 240mL of solution

4) 98 grams of sodium hydroxide in 2.2 liters of solution

5) How many grams of potassium carbonate are needed to make 200mL of a 2.5M solution?

Determine the number of grams of solute needed to make the solution, not how many moles.

6) 2 L of 6 M HCl

7) 1.5 L of 2 M NaOH

8) 45 mL of 0.12M Sodium Carbonate

9) 250 mL of 0.75M Lithium Nitrite

10) 56 mL of 1.1M Iron (II) Phosphate